REMARKS

Reconsideration and allowance of the above-referenced application are respectfully requested.

Upon entry of this amendment, claims 26-30, 32-55, 57-71, 73-76, 78, 79, 81-91, 93-99, and 103-106 will remain in the application.

Section 112 Rejections

Claims 26-30, 32-55, 57-71, 73-76, 78, 79, 81-91, 93-99, and 103-106 were rejected under 35 U.S.C. 112, second paragraph, for allegedly being indefinite.

The claims have been amended as suggested in the Action. Accordingly, Applicants submit that the claims are now in condition for allowance.

Double Patenting

Claims 26-30, 32-55, 57-71, 73-76, 78, 79, 81-91, 93-99, and 103-106 were rejected under the judicially created doctrine of obviousness-type double patenting as being allegedly unpatentable over eighteen different patents and provisionally over Patent Application Serial No. 09/939,767.

Applicants submit herewith a Terminal Disclaimer in compliance with 37 CFR 1.321(c) to overcome the rejections as to U.S. Patent Nos. 6,242,290 and 6,399,454.

Applicants submit that the amendments made to the claims make them patentably distinct over the other patents and patent application. Specifically, independent claims 26, 34, 42, 51, 59, 67, 76, 82, and 86 have been amended to recite that a gettering layer comprising phosphorus is formed over the semiconductor film after crystallization, which is supported in the Specification at page 10, line 4 to page 14, line 13 (First Embodiment) and in Figs. 1(A)-1(D). Also, independent claims 81, 83-85 and 87-89 have been amended so as to include a feature that a gettering material is introduced into an entire surface of the crystallized semiconductor film, which is supported in the Specification at page 14, line 14 to page 19, line 10 (Second embodiment) and in Figs. 2(A)-2(D). None of the cited patents teach or suggest these features. Accordingly, Applicants submit that claims 26-30, 32-55, 57-71, 73-76, 78, 79, 81-91, 93-99, and 103-106 are in condition for allowance.

Applicants submit a check in the amount of $400 including the fees for a Petition for Extension of Time, Information Disclosure Statement, and the fee for submission of the Terminal Disclaimer.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

3-21-03

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VERSION TO SHOW CHANGES MADE

Please amend the application as follows.

In the Claims:

The claims have been amended as follows.

26. (Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film on an insulating surface;

providing said semiconductor film with a catalyst metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote the crystallization of the semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization; and

heating said semiconductor film and said gettering layer at a temperature from 500°C to 800°C in order to getter the catalyst metal in said semiconductor film using said gettering layer.

27. (Amended) A method according to claim 26 wherein said semiconductor device is a photoelectric conversion device.

34.(Amended) A method of manufacturing a semiconductor device comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing said semiconductor film with a catalyst metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization; and

heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer.

35.(Amended) A method according to claim 34 wherein said semiconductor device is a photoelectric conversion device.

42.(Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film on an insulating surface;

providing a catalyst metal-containing material on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization; and

heating said semiconductor film and said gettering layer in a nitrogen atmosphere in order to getter the catalyst metal contained in said semiconductor film by said gettering layer.

43. (Amended) A method according to claim 42 wherein said semiconductor device is a photoelectric conversion device.

51. (Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a semiconductor film comprising amorphous silicon on an insulating surface;

providing a catalyst metal-containing material on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and to promote the crystallization thereof;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization;

heating said semiconductor film and said gettering layer at a temperature from 500°C to 800°C in order to getter the metal included in said semiconductor film by said gettering layer; and

forming a doped semiconductor film on said semiconductor film to form a junction.

52.(Amended) A method according to claim 51 wherein said semiconductor device is a photoelectric conversion device.

59.(Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing a catalyst metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said catalyst metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization thereof;

heating said semiconductor film and said gettering layer in order to getter the catalyst metal in said semiconductor film by said gettering layer; and

forming a junction using said intrinsic semiconductor film.

60. (Amended) A method according to claim 59 wherein said semiconductor device is a photoelectric conversion device.

67. (Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a semiconductor film comprising amorphous silicon formed on an insulating surface;

providing a catalyst metal-containing material on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization; and

heating said semiconductor film and said gettering layer in a nitrogen atmosphere in order to getter the catalyst metal contained in said semiconductor film by said gettering layer; and

forming a junction on said semiconductor film.

68. (Amended) A method according to claim 67 wherein said semiconductor device is a photoelectric conversion device.

76. (Amended) A method of manufacturing a semiconductor device, comprising:

providing a semiconductor film on an insulating surface;

forming a catalyst metal-containing material on said semiconductor film, said catalyst being a material which facilitates crystallization of said semiconductor film, but which when present in a final product of the semiconductor device degrades operation of the semiconductor device;

crystallizing said semiconductor film by heating in a way that causes said catalyst metal-containing material to diffuse into at least a part of the semiconductor film, said catalyst metal-containing material when so diffused functioning to facilitate said crystallization;

forming a gettering layer comprising phosphorus over said semiconductor film after said crystallization; and

processing said semiconductor film and said gettering layer to remove at least one portion of said catalyst metal in said semiconductor film.

81. (Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film on an insulating surface;

providing said semiconductor film with a metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and function to promote the crystallization of the semiconductor film;

introducing a gettering material into [a portion] an entire surface of said crystallized semiconductor film;

heating said semiconductor film after introducing said gettering material at a temperature from 500°C to 800°C in order to getter the metal in said semiconductor film; and

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film.

82. (Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing said semiconductor film with a metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization; and

heating said semiconductor film and said gettering layer in order to getter the metal in said semiconductor film by said gettering layer.

83.(Amended) A method of manufacturing a semiconductor device comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing said semiconductor film with a metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

heating said semiconductor film after introducing said gettering material in order to getter the metal in said semiconductor film; and

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film.

84.(Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing said semiconductor film with a metal-containing material;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film and function to promote the crystallization of said semiconductor film;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

heating said semiconductor film after introducing said gettering material in order to getter the metal in said semiconductor film; and

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film.

85. (Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film on an insulating surface;

providing a metal-containing material on said semiconductor film;

crystallizing said semiconductor film by heating in a way that causes said metal to diffuse through the semiconductor film

and function to promote the crystallization of said semiconductor film;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

heating said semiconductor film in a nitrogen atmosphere after introducing said gettering material in order to getter the metal contained in said semiconductor film; and

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film.

86. (Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

forming a gettering layer comprising phosphorus over said semiconductor film after the crystallization thereof;

heating said semiconductor film and said gettering layer in order to getter the metal in said semiconductor film by said gettering layer; and

forming a junction using an intrinsic semiconductor film.

87. (Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a substantially intrinsic semiconductor film on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

heating said semiconductor film after introducing said gettering material in order to getter the metal in said semiconductor film by said phosphorus;

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film; and

forming a junction using a doped semiconductor film.

88. (Amended) A method of manufacturing a semiconductor device having a junction, said method comprising:

providing a semiconductor film doped with boron at a concentration of 0.001-0.1 atm% on an insulating surface;

providing a metal on said semiconductor film;

crystallizing said semiconductor film by heating to cause said metal to diffuse through the semiconductor film and to promote the crystallization of said semiconductor film;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

heating said semiconductor film and said gettering material in order to getter the metal in said semiconductor film;

removing [said portion] at least said entire surface after gettering the metal in said semiconductor film; and

forming a junction using an intrinsic semiconductor film.

89. (Amended) A method of manufacturing a semiconductor device comprising:

providing a semiconductor film on an insulating surface;

forming a metal-containing material on said semiconductor film, said metal being a material which facilitates crystallization of said semiconductor film, but which when present in a final product of the semiconductor device degrades operation of the semiconductor device;

crystallizing said semiconductor film by heating in a way that causes said metal-containing material to diffuse into at least a part of the semiconductor film, said metal-containing material when so diffused functioning to facilitate said crystallization;

introducing a gettering material into [a portion] an entire surface of the crystallized semiconductor film;

processing said semiconductor film after introducing said gettering material to remove at least one portion of said metal in said semiconductor film; and

removing [said portion] at least said entire surface of the crystallized semiconductor film after gettering the metal in said semiconductor film.

97. (Amended) A method according to any one of claims 81-89 wherein said semiconductor device is a photoelectric conversion device.